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INDEPENDENT REVIEW OF THE OF THE
DRAFT BUILDING RADIATION SURVEY DATA INITIAL EVALUATION REPORT,
FORMER HUNTERS POINT NAVAL SHIPYARD,
SAN FRANCISCO, CALIFORNIA

General Independent Assessment Observations:

Two general themes are relevant to the various data evaluations that have been performed: data integrity and usability. Overall, the building evaluation report provides compelling evidence regarding the integrity of data, primarily from the results of the data duplication evaluation that the radiological scanning and static measurement data should be qualified as suspect and, therefore, unusable for building release decisions. Regarding the detector scan speed and coverage findings, additional factors that were not evident in the discussions could be of benefit to the evaluation concerning data usability. The review also identified potential technical uncertainties related to the assumptions and findings of the data distribution statistical evaluation.

The additional factors and uncertainties are discussed in the comment matrix below. The comments provided do not impact the data integrity conclusion but are presented as recommendations for evaluation thoroughness and objectivity, to quantify the overall impact of a particular finding to data usability decisions, and as considerations for any planned evaluations that will use the methods described in the report.

Comment #	Section	Page	Applicable Text / Comment	Observations and Recommendation
1	4.2	4.3	*From these results, if the entire floor area was scanned (100 percent scan coverage) during the scan duration, then the detector must have been moving an average of 2.85 cm/s, which is more than twice the design scan rate. Also, the design scan rate is 48 percent of the calculated average scan rate.* The implications of scan speed on data usability were not discussed. A scan speed greater than that which was planned would not necessarily preclude data usability, provided the scanning minimum detection. For completeness, consider	The results of the assessment demonstrated that any or all of the following conditions are plausible, individually or in combination: scan speed exceeding survey plan specifications, coverage less than required, or the detector remaining in a static position (directly impacting coverage). Coverage is particularly problematic in any Class 1 survey units that require 100% coverage, less so for Class 2 and 3 survey units dependent upon rationale for the planned coverage of judgmental for Class 3 and up to 100% for Class 2. The report included only Class 1 areas in the examples.

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			including an evaluation and assessment of both the planned *a priori* and the *a posteriori* scanning minimum detectable concentrations (MDC_{SCAN}) and compare the detection sensitivities with the surface release criteria. Note, however, that the applicable contaminants of concern for the example data sets were not specified.	Therefore, the implications of deviations in planned to the calculated coverage cannot be assessed at this time. Of course, perceived or actual evidence of final status survey data sets presented as dynamic scan data but acquired from a static detector is a definite integrity concern and cause for rejection of suspect data. ORAU calculated both MDC_{SCAN}s, although several detector (43-37-1) performance assumptions were necessary as TtEC data forms shown in the report did not include the information. The following inputs were used in the calculation: $$\frac{\left(\frac{60}{i}\right) \times d'\sqrt{b_i}}{\sqrt{p} \times \varepsilon_{Total} \times \frac{probe\ area}{100\ cm^2}}$$ • A total efficiency of 0.20 was assumed, based on a nominal gas proportional detector total efficiency for Cs-137, Sr/Y-90 would have a higher total efficiency. • The assumed detector background of 988 cpm was based on the Gross Beta CPM and Net Beta CPM data shown in Figure 4-2 of the building evaluation report. • The selected index of sensitivity (d') value = 2.92 (0.95 true positive and 0.10 false positive proportions). • The design and calculated survey scan speeds of 1.37 and 2.85 cm/s were used in the *a priori* and the *a posteriori* MDC_{SCAN} calculations, respectively

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				- Surveyor efficiency was the assumed default value of 0.5. - The postulated hot spot size = 10 cm $\times$ 10 cm. - Geometry factor = 1 to prevent artificially decreasing the detection sensitivity simply due to the use of a large-area detector. The output was: *a priori* $MDC_{SCAN} = 1,900$ dpm/100 cm^2 *a posteriori* $MDC_{SCAN} = 2,700$ dpm/100 cm^2 Both values are less than the Cs-137 but greater than the Sr-90 release criteria provided in Table 4-2 of the draft *Work Plan–Radiological Survey and Sampling*, indicating that in the absence of integrity and coverage issues, beta scan performance may have been acceptable, in the case of this example, if Cs-137 was the radionuclide of concern. The alpha MDC_{SCAN} could also be determined, although it is unlikely that the result for a similar postulated hot spot size would be adequate to detect Ra-226 contamination at the 100 dpm/100 cm^2 release limit, even for the survey design scan speed. This type of assessment provides additional information to stakeholders as to the impact of various findings and supports objectivity in the evaluation process.

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2	5.1	5-2	• *The initial and verification surveys were sampled from the same population, and the distribution of the results should have the same shape, and therefore pass the K-S Test* • *The responses of different detectors used in the initial and verification surveys are not significant enough to affect the results of the K-S Tests.* In viewing the B271 Floors and Walls data shown in Figure 5-1, it is evident that two different detector configurations or types were used for the data collected. Section 2 of the report mentions the use of 4-detector arrays in prior surveys. The 2011 data are several factors higher than the 2016 re-surveys, indicating that a single hand-held detector was used. As the K-S test is sensitive to both shape and location of the distribution, the underlying assumptions of the evaluation may not have been satisfied.	Refer to Comment No. 4 recommendations.
3	5.3	5-2	H_0: *the initial and verification data come from a population with the same distribution (refuting the allegation that the survey instrument was not in motion during the initial survey)* The parenthetical statement is not technically accurate. Failure to reject H_0 does not refute the allegation that the detector was static, rather the evidence failed to demonstrate that the initial and verification came from different population distributions.	Recommend deleting or otherwise rewording the parenthetical statement.

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4	5.3	5-3 5-4	*The K-S Test results conflict with the expected conclusions that a true allegation would result in rejecting H_o for Building 146 and failing to reject H_o for Building 271.* *The use of the Data Distribution Comparison method to support or refute allegations regarding survey instrument movement during scanning is inconclusive.*	Further evaluations should ensure that populations selected are data generated from the same or similar detector types and geometries and/or separate assessments of distribution independently of location.
			Rather than inconclusive, the evaluation results may have been due to selected comparative data populations, violating some of the underlying assumptions, or the K-S test incorrectly applied.	
5	6	All	The methods used to identify duplicative data series were clearly explained, thorough, and provided intuitive and very effective evidence of data manipulation.	None